sub-pixels of each of a plurality of pixels of an electronic display, wherein each pixel of the plurality of pixels comprises three sub-pixels;

determine that a brightness of the electronic display is less than a threshold brightness;

in response to determining that the brightness of the electronic display is less than the threshold brightness, map the input image data from the linear color space to a non-linear color space;

apply a three-dimensional (3D) lookup table based on the input image data in the non-linear color space to generate compensated image data, wherein the 3D lookup table is configured to transform the luminance values for the three sub-pixels of each pixel to corrected luminance values, wherein the corrected luminance values are compensated for an expected amount of voltage drop associated with an internal resistance of each sub-pixel and a current leakage between sub-pixels of each pixel; and

map the compensated image data from the non-linear color space to the linear color space to generate processed image data for display on the electronic display.

19. The non-transitory medium of claim **18**, wherein, when executed by the processor, the instructions cause the processor to generate the 3D lookup table based at least in part on a temperature of the sub-pixels.

20. The non-transitory medium of claim **18**, wherein the brightness comprises a light intensity output of the electronic display.

21. The non-transitory medium of claim **18**, wherein each axis of the 3D lookup table corresponds to luminance value of a sub-pixel of the three sub-pixels.

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